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Turbine with maximum utilization of energy and multi-purpose use.

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Present-day motor power generators have a practical efficiency of only one third to one fourth in general. While the construction of hydraulic or steam turbines is not too complicated, the construction of internal combustion engines is much more difficult and expensive to achieve: camshafts, crankshafts, etc. A turbine of the following type would make more sense.

A solid metallic sphere is crossed transversally by a shaft (fig. 1). Perpendicular to the shaft, in the middle of the sphere, a V gorge of 20° cuts the sphere in two disks A, B, which are immovably attached to the two shafts C, D. In practical construction the disks, cast in the appropriate shape, are placed in the position viewed from above in fig. 2, and the shafts are each assembled in two ball bearings. In the rotation movement the two disks will meet exactly in E, dead centre, while in the opposite side the gap will be of about 40°, as in F.

As it is absolutely essential that these two disks rotate in perfect concordance, this aim will be reached by connecting them in three possible ways:

By central gearwheels: the gearwheel G is firmly attached to the C shaft and to the A disk. The gearwheel H is immovably attached to disk B and to shaft D (fig.3). In a turbine with 2 m in diameter with gearwheels of 0.60 m the cogs will be 0.20 m long: with this large size the wear and tear will be minimal.

By cogs, I, carved in a radius-like fashion on the disks (fig.4), where this cog size is such that several of them are engaged at one time, so that the pressure between them will be so weak as to require water as the only lubricating agent, with leaks being impossible in dead centre E.

By 2 pairs of gearwheels J and K (fig. 5) joining shafts C and D on shaft L. Depending on the ratio of the gearwheels, the rotation of shaft L will be more or less rapid and it will be possible to connect several turbines on this same shaft L, without forcing them to turn in opposite directions from one another, except when they are on each side of said shaft L.

In order to have a sturdy assembly of disks on the shafts, shaft D, for instance, will have a plate in M, and it will be slightly cone-shaped. To disassemble, it is required to screw a few bolts in threaded holes of the plate. This way the disk will be driven out. The plate holes will be spaced some $^{1}/_{10}$ in regard to the cogs of the gearwheel, which will enable another position to catch up the blade play.

If a waterstream is directed against gorge *F (fig. 2)*, which in hydraulics is the working position, and if on the other hand each disk has 4 or 5 half blades securing the complete sealing, as shown in fig. 6, the disks will be driven at the liquid

speed and will reouperate all its thrust. Thus, the water will not even rub on any more because in this instance the disks will follow its movement.

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The blades N of disk A and O of disk B will not need to overlap one on top of the other but only by a few millimeters when the gap is greatest. They will lean toward each other at an angle equivalent to $^1/_4$ of the opening of gorge F , i.e. 10° approximately. Conversely, the blades of one disk can fit exactly the blades of the other, the position of these blades coming to the same point only in the next cycle. This fine tuning being done, the leaks should be nil. The inconvenience of these blades is that they require a rather large housing P in the opposite disk, in position E, which represents a loss of energy. The best is to make them in the shape of saw teeth reversed in one disk in relation to those of the other disk (fig. 7). They should be as narrow as possible in Q , with just the necessary thickness to get clear, like the cogs of gears in rotation. For a reason that will be explained further down, these blades can be dismantled. The disks are to be left in their initial form (fig. 1 and 2); gorges will be carved in them with the shape of a swallow tail where the blades will be inserted and secured by means of screws or bolts.

To avoid loss of lubricant, the two coupling gearwheels G and H will be covered by a dome R immovably attached to the gearwheel H and to disk B where it will be bolted on . As the movement is one rotation, the back of gearwheel G, the dome and its housing in disk A will all be spherical. The loss of surface on the blades, caused by the gearwheel and the dome, will be less significant and the exhaust will be easier. To assemble this dome, the blades must be removable. To complete the waterproofing of the lubrication of gearwheel G it will require a type of segment S. This lubrication of gearwheels G and H will be done either by one of the hollow shafts or by a hole in T crossing disk-gear and visible by one opening pierced in the shell. The way the main motor or receptor parts work having been defined, it is apparent that these disks and blades, always spherical, must be enclosed in a double-domed shell equally spherical. Fig. 8 sketches half of the inner side of disk A.

Regarding the hydraulic functioning, the best position of dead centre E and gorge F will be situated on the oblique line of figure 8. The water will get in through a triangular opening U uncovering totally the beginning of the gorge between disks. By reason of the rotation of the blade and of the divergence of the disks, which creates a larger housing, it is useful to have a second inlet V. With 5 blades and taking into consideration the liquid's lack of compressibility, the exhaust will start at about 70° after this second intake and it will be totally opened vertically. It will easily be completed up to dead centre E, with the help of the centrifugal force. During the 70° where the thrust is strongest it will undoubtedly be necessary to install a compressor W to avoid the waterhammers. Fig. 9 shows the turbine enclosed in its half-shells in a position viewed from above. The shafts and their bearings will be placed in a type of pipe cast in one piece with which they form a solid unit. Strong ball bearings will keep disks in contact without forcing at dead centre. The functioning will be very easy, without friction, save for the little segment 8 and watertightness seals described further down. The spherical movements will avoid and eliminate any alternate movement.

By reversing the motion, this turbine becomes a pump with a strong output at low speeds.

Steam supply: — Because of water's lack of elasticity, the divergence of the disks or the gorge's angle can but scarcely be 40°. Besides, at a greater angle the dome covering the gearwheels cannot be easily built. On the other hand, using gases and by reason of their suppleness the angle of the gorge can reach 60° (fig. 10). In this case each disk won't have but

two half blades diametrically opposite, always shaped like saw teeth. The surfaces in contact will more or less have the shape indicated in fig. 4. For water as well as for gas the watertightness and gastightness will be achieved by double-thickness plaques made outof a soft metal as in a crown-shaped seal in a gorge as close as possible to the rim on the disks and the blades. They will slightly be pressed against the inside of the shell and over the shell in disk A by means of small springs. They will be kept in place in X (fig. 4) by screws with spur-like projections.

A small piston Y with drawer movement will allow the intake of steam through a single opening. Its movement is ensured by a runner Z having 2 conical cams moving on a ribbed shaft with the help of metal weights that are put in motion by centrifugal force. Thus, this small piston while having a drawer movement will function as a regulator.

The continual intake would lose the advantage of the reduction in pressure. The turbine's spherical body is to be heat insulated in order to avoid heat loss.

The running will be very smooth, 50 to 10,000 revolutions. Fig.11 presents the front view of the cylinder's expanded form (fig.12), which is a reduction to $^1/_{10}$ of a 0.40 m turbine.

In this turbine with a 0.40 m diameter, the intake starts at about 0.10 m after point E and it will go on inversely proportionate to the pressure exerted on from 0.30 m to 0.50 m, i.e., from a to b. This thrust will end by the expansion up to the beginning of the exhaust c. Consequently, the intake and expansion will have an effect over 0.60 m approximately. The exhaust will run up to the dead centre E for about 0.30 m through this large opening, the exit will happen without any noise, all energy being totally spent. If one would make a complete condensation of this exhaust in an airtight reservoir, a piston could recapture the liquid, thus increasing power. Fig 13 depicts a side view of the turbine, with at the level of the intake opening from E to a and the wide opening for the exhaust from c to E.

Feeding by internal combustion. — The main construction is always the same, as with steam. If possible one should utilize for the disks metals with an expansion coefficient lower than the coefficient of the metal used for the shell.

Fig. 14 shows a side view of a fixed motor whereby the disks are in contact in E, therefore on side of inlet *d* and gas outlet e. A very large exhaust with radiator recovers the maximum of thermal energy from gases; cooling of these gases helps their expulsion.

The shell should also be horizontally cut at the assembly brim *f*; it should be surrounded by a water jacket *g*. The recovered steam is gathered under dome *h*, which in this case can be bigger or taller. In the important types it will be necessary to cool the disks. To this effect, each shaft will either have holes or be made up of hollow pipes for water circulation. In order to set the flow in motion, a piece of shaft *j* (fig. 15) should be screwed on the external part *I* (fig.5) of the shaft on each disk. A metal sheet put between these two shafts will prevent the possible leakage of water into the crankcase. On this end of the shaft a box with two compartments should be set having a cold water inlet *k* and a hot water outlet *l*. This box is to be firmly fixed by a lug coming from the crankcase, while on the *inside*, attached to the shaft in rotation, two spiraled pipes (fig. 16) installed in opposite direction to each other, each in its own casing, will gather and discharge the liquid. The wall between the two compartments simply prevents the mixing of the waters while the one on the side of the crankshaft will be set with a ring *m* which will be well enough kept in its position by the pressure on the crown *supporting* the spiral and it will prevent leakage.

Functioning. — To start the initial burning, air is brought a little in advance into a tube, which we may call exploder, and the fuel is spurted on

an electric resistance that had become red hot in 10 to 20 seconds. Air and fuel will be supplied by two small pistons parallel to this exploder *n* which will be driven by 2 pairs of conical cams *o* , *p* which, by sliding on the shaft *q*, work as regulator. This exploder is composed by a tube *r* with the shape of the beginning of the gorge between disks (fig.17). This first tube is surrounded by a larger one, leaving between them a jacket *s*, which will collect the steam gathered inside the dome. The purpose of this steam is at the same time to avoid the excess heat from the first tube. It will constitute a lagging for the gas arriving on the disks and it will help push the blades. Supplied with steam or gas, this turbine can work in any position; however, the supplying and lubricating can be hampered by it.

Start up. — After heating up the resistance, a few rotations will make the injections very easy because there is no compression to be overcome. An electric generator (dynamo) coiled on the shaft will suffice easily. The effect won't be $^1/_{20}$ of the one required for the start up of today's motors.

As with steam there will be 2 driving thrusts per turn, this will be equivalent to a 4 cylinder motor. While average cylinders only have a stroke of 0.10 m and a bore of 0.08 m, or 50 cm^2. The turbine, for example of 0.40 m. in diameter, will have a thrust of 0.60 m over 180 cm^2

The range of 0.15 m to 0.50 m in diameter will be large enough to satisfy the needs for cars and trucks of great tonnage, even using weak ratios of pressure.

On the other hand, while in today's motors the exhaust absorbs $^1/_3$ of the power, in this turbine it is wasted only slightly and above all without noise. This large exhaust opening will be closed by two metal sheets having a space between them; the one on the inside will have many holes made in greater number on the brim to force the gases to spread in the radiator *e* (fig.14). The external door will have in *t* the beginning of the exhaust pipe (fig.17)

For automobiles, a valve installed in this pipe will ensure a smooth braking downhill. For these different purposes, parts subjected to water, steam and combustion should be made, if possible, in stainless metal.

SUMMARY

A better cost price, the manufacturing being much simpler than at present, save for the hydraulic version

For different purposes, the efficiency will be three times greater.

Size and weight will be reduced by more than half.

Therefore no alternate movements, no friction, little wear and tear, negligible need for lubrication.

It works in any position; very smooth with gas from 50 to 5,000 rotations.

No need for gearbox, ever.

Exhaust without any noise.

Maximum recovery of thermal power.

Possible use of non-flammable fuel at normal temperatures; no risk of fire.

Easy start up; operation doesn't require any special knowledge.

Therefore motor driven machines become within reach of everybody.

Jean **SAUMON**, alias **ADRIEN**.

THE PATENT/TRADE-MARK OFFICE HEREBY
ACKNOWLEDGES RECEIPT OF THE FOLLOWING:

Supplemental Information Disclosure Statement (1 page), list of cited patents (1 page), copy of each listed item, receipt card.

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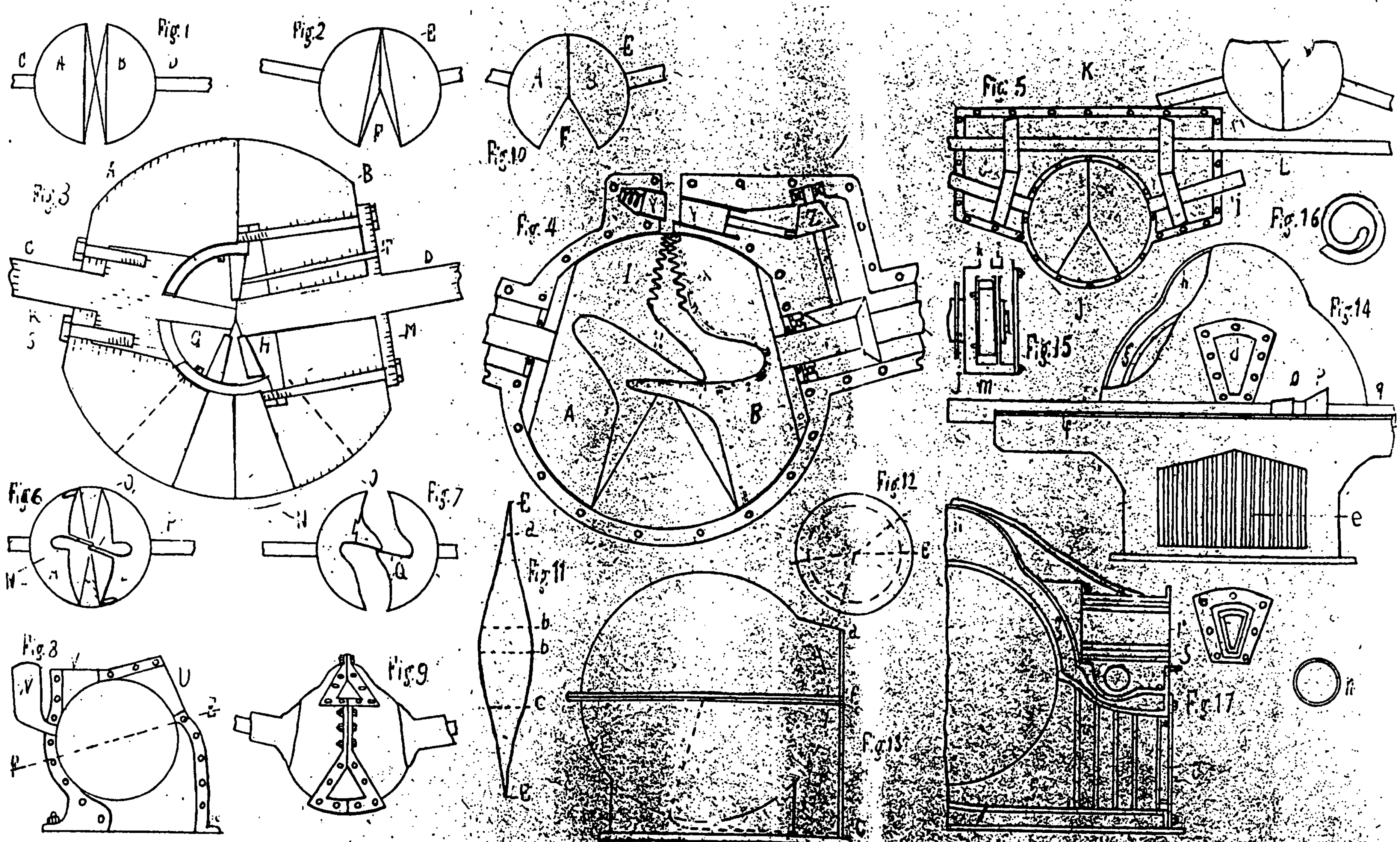
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